What is claimed is:

1. A self-sustained pulsating laser diode which having a double-heterostructure minimally comprising:

a cladding layer of a first conductivity type;

a multi-quantum well active layer; and

a cladding layer of a second conductivity type each being arranged on a semiconductor substrate of the first conductivity type, wherein the number of said quantum wells being at least 5 and no greater than 10; and

said layer thickness of a flat part of said cladding layer having a current blocking structure is at least 300nm and no greater than 500nm;

and further wherein a carrier density in said flat part of the cladding layer having a current blocking structure is at least $1\times10^{17}cm^{-3}$ and no greater than $5\times10^{17}cm^{-3}$.

2. A self-sustained pulsating laser diode which having a double-heterostructure minimally comprising:

a cladding layer of a first conductivity type;

a multi-quantum well active layer; and

a cladding layer of a second conductivity type each being arranged on a semiconductor substrate of the first conductivity type, wherein an effective refractive index difference parallel to the layer is at least 7×10^{-4} and no greater than 3×10^{-3}, and further wherein a carrier density in a flat part of said cladding layer having a current blocking structure is at least $1\times10^{17}cm^{-3}$ and no greater than $5\times10^{17}cm^{-3}$.

3. A self-sustained pulsating laser diode according to claim 1, wherein said cladding layer is made of a semiconductor that includes AlGaInP, and the said active

layer is a semiconductor that includes either or both GaInP and AlGaInP.

4. A self-sustained pulsating laser diode according to claim 2, wherein said cladding layer is made of a semiconductor that includes AlGaInP, and the said active layer is a semiconductor that includes either or both GaInP and AlGaInP.

5. A self-sustained pulsating laser diode according to claim 1, wherein the (001) plane of said semiconductor substrate is misoriented by 5 degrees or more toward the [110] direction, and wherein said multi-quantum well active layer consists of compressively strained quantum wells.

6. A self-sustained pulsating laser diode according to claim 2, wherein the (001) plane of said semiconductor substrate is misoriented by 5 degrees or more toward the [110] direction, and wherein said multi-quantum well active layer consists of compressively strained quantum wells.

7. A self-sustained pulsating laser diode according to claim 3, wherein the (001) plane of said semiconductor substrate is misoriented by 5 degrees or more toward the [110] direction, and wherein said multi-quantum well active layer consists of compressively strained quantum wells.

8. A self-sustained pulsating laser diode according to claim 4, wherein the (001) plane of said semiconductor substrate is misoriented by 5 degrees or more toward the [110] direction, and wherein said multi-quantum well active layer consists of compressively strained quantum wells.

9. A self-sustained pulsating laser diode which having a double-heterostructure minimally comprising:

a cladding layer of a first conductivity type;

a multi-quantum well active layer; and

a cladding layer of a second conductivity type each being arranged on a semiconductor substrate of the first conductivity type, wherein the number of said quantum wells being at least 5; and

said layer thickness of a flat part of said cladding layer having a current blocking structure is at least 300nm; and further wherein an effective refractive index difference parallel to the layer (Δn) is at least 7×10^{-4} and no greater than 3×10^{-3}.

10. A self-sustained pulsating laser diode according to claim 9, said effective refractive index difference parallel to the layer (Δn) is around 1×10^{-3}.

11. A self-sustained pulsating laser diode according to claim 1, wherein said carrier density in said flat part of the cladding layer having a current blocking structure is less than $3\times10^{17}cm^{-3}$.

12. A self-sustained pulsating laser diode according to claim 2, wherein said carrier density in said flat part of the cladding layer having a current blocking structure is less than $3\times10^{17}cm^{-3}$.

A22 B47